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AGRICULTURAL MEMORANDUM NO 734

Correlation between monthly means of illumination and sunshine: Agroclimatic area averages

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Following the methods explained in Ag.Mem.733, the following results were obtained:-

Equations in the form $I = dS + eT + f$

Kew	Month	d	e	f	Correlations Total	Partial S	Partial T
	January	12.4	1.1	37.2	0.66	0.54	0.61
	February	23.7	1.79	53.0	0.84	0.79	0.62
	March	35.95	3.97	71.0	0.97	0.96	0.89
	April	38.75	4.38	135.8	0.86	0.85	0.70
	May	45.8	3.93	181.3	0.81	0.80	0.57
	June	38.85	5.34	254.5	0.89	0.86	0.65
	July	40.1	6.14	226.8	0.90	0.87	0.73
	August	38.85	3.23	195.7	0.89	0.87	0.60
	September	39.4	3.34	115.7	0.81	0.80	0.52
	October	24.65	2.75	83.5	0.87	0.78	0.70
	November	12.4	1.78	52.1	0.82	0.54	0.67
	December	12.2	1.01	28.5	0.80	0.68	0.67

It should be noted that the change in the T effect seems to be greater in regard to Illumination than Radiation although this may be due to the fact that sunshine measurement and Radiation are similarly affected by the smoke decrease. The higher total correlations in Ag.Mem.733 seem to confirm this.

Eskdalemuir records of mean monthly illumination seem to be too low in the years 1959-1961, so only the subsequent data were analysed. The results were:-

Eskdalemuir	Month	d_1	f_1	Correlation
	January	20.0	25.8	0.75
	February	26.9	67.5	0.93
	March	41.0	107.9	0.83
	April	43.75	183.4	0.89
	May	48.8	231.9	0.83
	June	30.5	348.0	0.72
	July	44.9	247.3	0.92
	August	49.9	178.4	0.89
	September	38.75	145.8	0.97
	October	22.5	94.9	0.82
	November	14.35	46.6	0.88
	December	13.25	23.2	0.90

Agroclimatic Areal Averages

As in Ag.Mem.733, T can be taken as 16 in the Kew formulae and interpolations between Kew and Eskdalemuir be used for estimates of average illumination derived from areal averages of sunshine. The results are given in the Appendix.

A similar analysis was carried out on Lerwick data, 1959–1972, with the following results:-

Lerwick	Month	d_2	f_2	Correlation
	January	15.05	15.45	0.86
	February	20.1	48.5	0.96
	March	35.1	92.6	0.59
	April	33.2	206.8	0.88
	May	47.4	233.2	0.78
	June	48.8	287.2	0.85
	July	54.25	258	0.74
	August	37.9	227.4	0.81
	September	36.5	132.1	0.71
	October	20.35	74.0	0.56
	November	12.9	27.7	0.62
	December	11.3	11.9	0.78

Any comments or suggestions on this paper should be referred to the author.

Meteorological Office
Bracknell

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APPENDIX

Areal Averages of Illumination (Kilolux-hours)

Area	J	F	M	A	My	J	Jy	A	S	O	N	D
1N	55	125	245	400	510	535	490	425	315	160	70	40
1S	55	130	250	395	500	535	485	415	310	165	75	45
2	50	115	235	375	490	520	450	390	270	155	70	35
3	60	130	255	420	515	560	495	425	295	170	80	45
4	55	115	235	380	495	525	470	400	290	160	75	40
5	60	125	245	390	505	540	485	410	315	170	80	45
6	50	110	230	360	490	520	460	390	280	155	70	40
7	60	125	245	390	510	545	495	420	315	170	80	45
8	60	125	245	400	520	565	510	435	325	175	85	50
9	65	135	265	420	550	585	535	455	330	180	90	50
10	55	115	230	365	490	540	485	405	295	170	80	45
11	60	120	240	385	505	550	505	415	305	175	85	45
12	60	125	240	390	510	555	505	420	310	175	85	45
13	60	125	245	395	515	555	515	435	320	180	85	45
14	65	130	255	400	515	580	520	430	315	180	90	55
15W	65	125	245	385	500	570	515	425	305	180	90	55
15E	65	130	250	380	505	565	520	425	310	180	90	55
16	65	130	250	390	515	565	520	435	320	180	90	50
17W	70	135	260	410	540	580	535	455	325	190	90	55
17E	70	130	265	410	535	575	535	450	325	190	90	55
18N	70	135	255	400	520	580	530	445	320	185	95	55
18S	70	135	260	395	515	585	530	440	320	190	95	60
19	65	125	255	390	505	580	525	430	325	185	95	55
20	65	130	255	385	505	575	525	435	330	190	95	55
21	70	135	265	400	520	585	545	445	335	200	100	60
22W	65	130	255	390	515	525	535	445	330	195	95	55
22E	70	135	260	395	535	580	540	455	340	195	95	55
23	70	135	270	415	550	595	555	460	345	200	95	55
24	70	135	270	415	550	595	560	460	345	205	100	60
25N	75	135	265	405	520	590	550	450	335	195	100	60
25S	75	140	265	415	525	600	560	455	340	205	105	60
26	75	140	265	415	525	595	560	455	335	205	100	60
27	75	140	265	410	530	600	560	460	340	205	100	60
28	70	135	265	405	540	600	555	465	345	200	100	60
29	75	135	270	420	545	605	565	475	355	205	100	60
30	75	140	270	410	530	605	565	460	340	210	105	60
31N	75	140	270	420	535	605	570	465	345	205	105	65
31S	80	150	270	425	545	615	580	470	360	215	110	65
32	75	140	270	410	530	615	580	475	355	210	105	65
33W	75	140	270	410	530	610	575	470	350	210	105	65
33E	75	140	270	420	535	620	585	480	360	215	105	65
34	75	140	275	425	560	635	600	485	365	220	110	65
35	80	150	285	425	535	615	590	475	345	215	110	70
36	80	155	275	420	540	615	575	470	355	210	110	70
37N	80	150	275	425	565	620	600	480	365	225	110	70
37S	80	150	285	440	585	660	620	495	385	235	115	70
38N	80	145	275	420	555	630	605	480	365	225	110	65
38S	80	150	285	440	585	660	620	495	385	235	115	70
39W	80	140	275	420	550	625	595	480	370	230	110	65
39E	80	145	280	435	575	645	620	495	380	230	115	70
40	85	155	290	445	570	645	615	490	375	230	120	75

APPENDIX

Areal Averages of Illumination (Kilolux-hours) (Cont'd)

Area	J	F	M	A	My	J	Jy	A	S	O	N	D
41	80	150	285	425	540	615	580	465	350	215	115	65
42	80	150	285	430	550	625	595	480	365	220	115	70
43N	75	145	275	410	515	605	570	455	325	210	110	65
43S	80	150	285	430	555	630	600	470	355	225	115	75
44	75	150	280	420	530	605	575	465	350	210	105	65
45W	80	155	285	435	560	630	610	485	365	220	115	75
45E	80	155	285	430	550	625	600	485	370	220	115	75
46	85	155	285	435	565	640	620	500	380	235	115	75
IOW	85	160	300	460	585	685	640	515	395	240	120	75
47	70	145	285	435	570	605	545	475	335	195	95	55
48N	60	125	250	375	490	550	495	415	300	175	90	50
48S	65	130	260	390	495	560	515	430	310	180	95	50
49N	70	130	255	390	495	560	510	425	305	180	90	50
49S	70	130	260	390	490	570	505	430	305	180	95	50
50	75	145	275	420	540	610	555	460	335	200	100	60
51	70	135	260	405	515	590	545	445	325	195	100	60
52	75	145	270	415	535	605	565	460	340	205	105	65